

Representativeness of CRPAQS PM2.5 and PM10 Measurements



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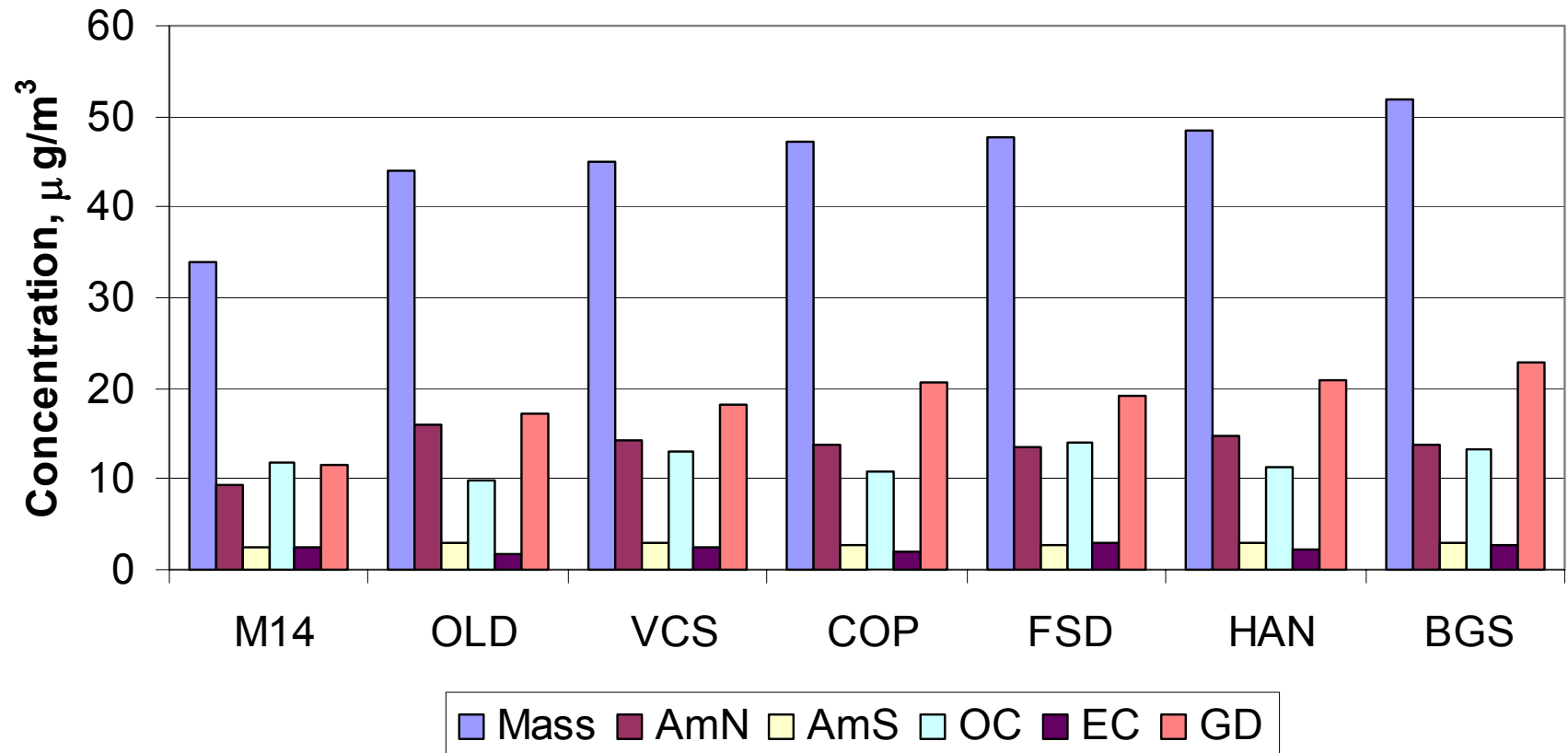
Desert Research Institute

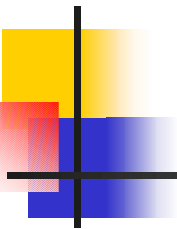
CRPAQS Data Analysis Workshop

March 9-10, 2004



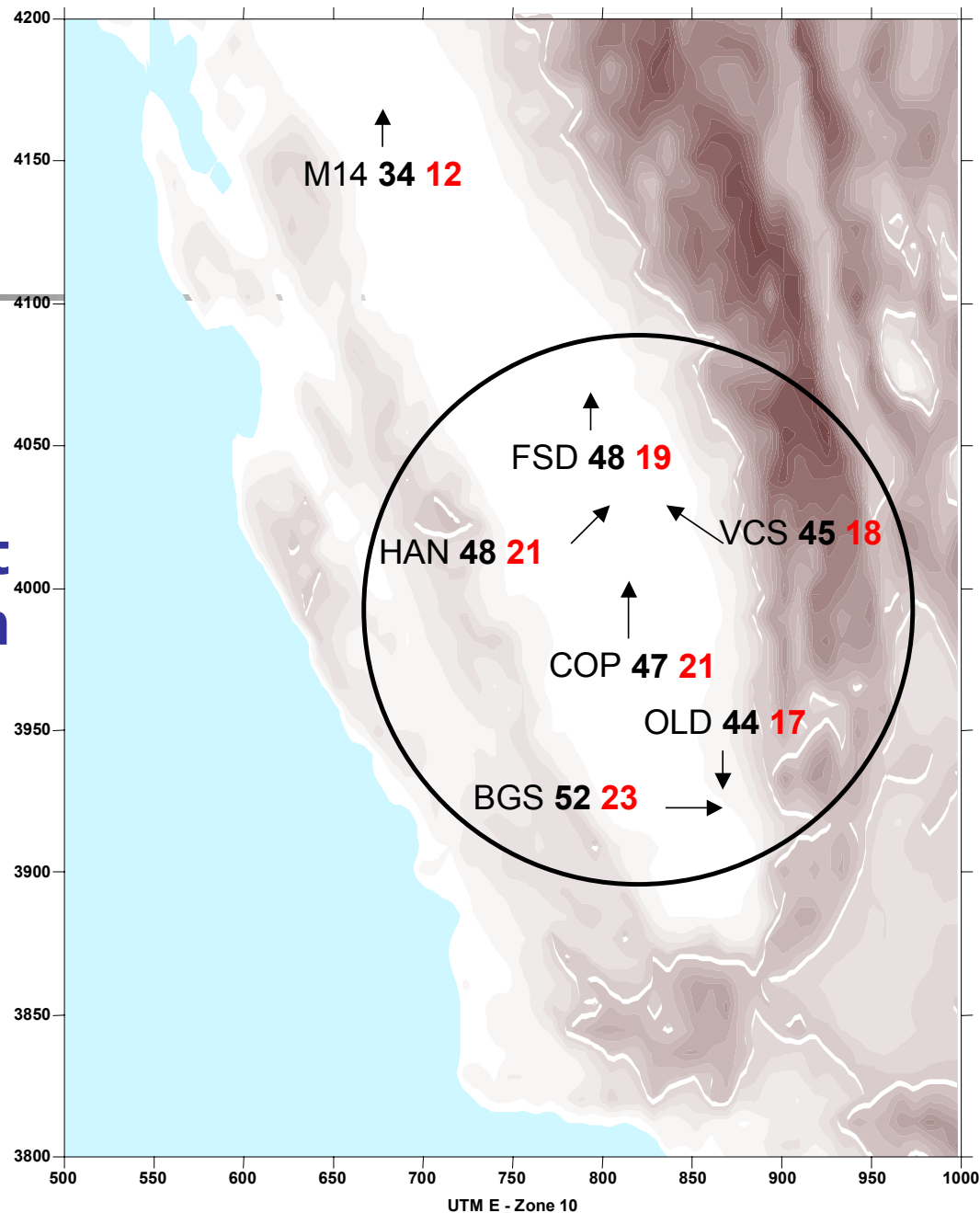
Spatial variation in PM10 measurements





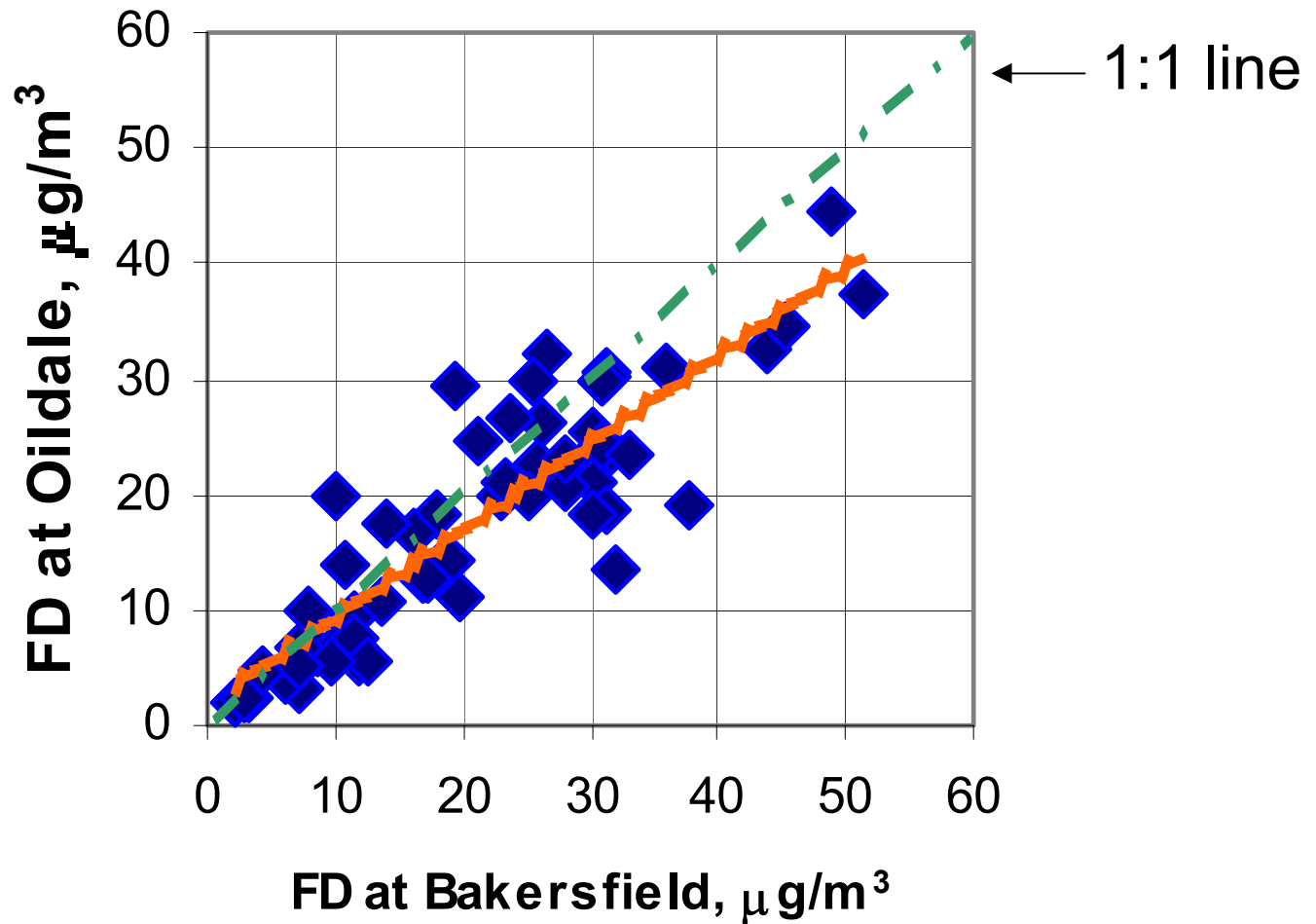
**Average PM10 mass
and **geological dust** at
Modesto is lower than
other sites where
concentrations are
relatively uniform**

**Urban scale: 100-km
radius centered on COP**

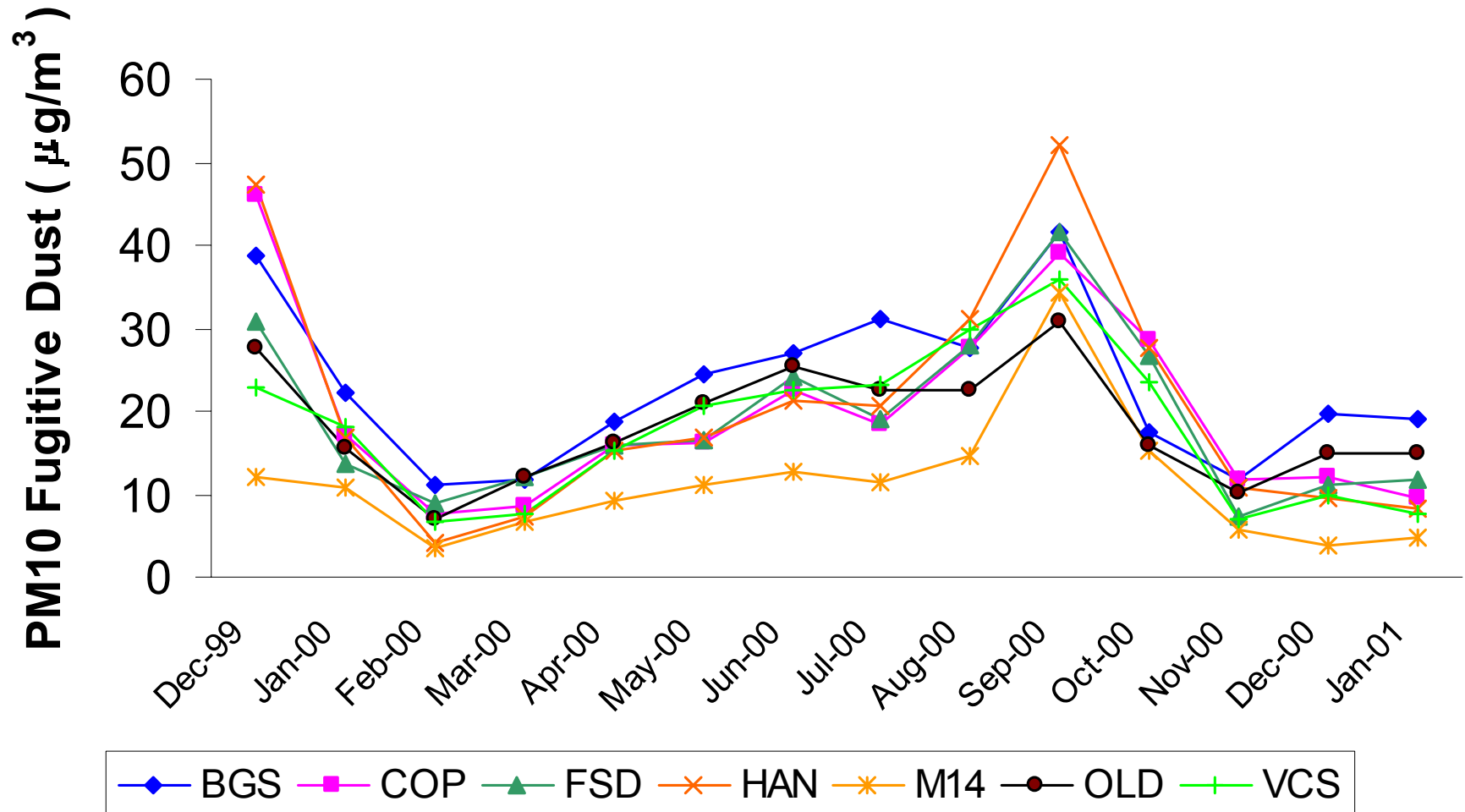




PM10 geological dust at Oildale is 25% lower than at Bakersfield 4 miles away

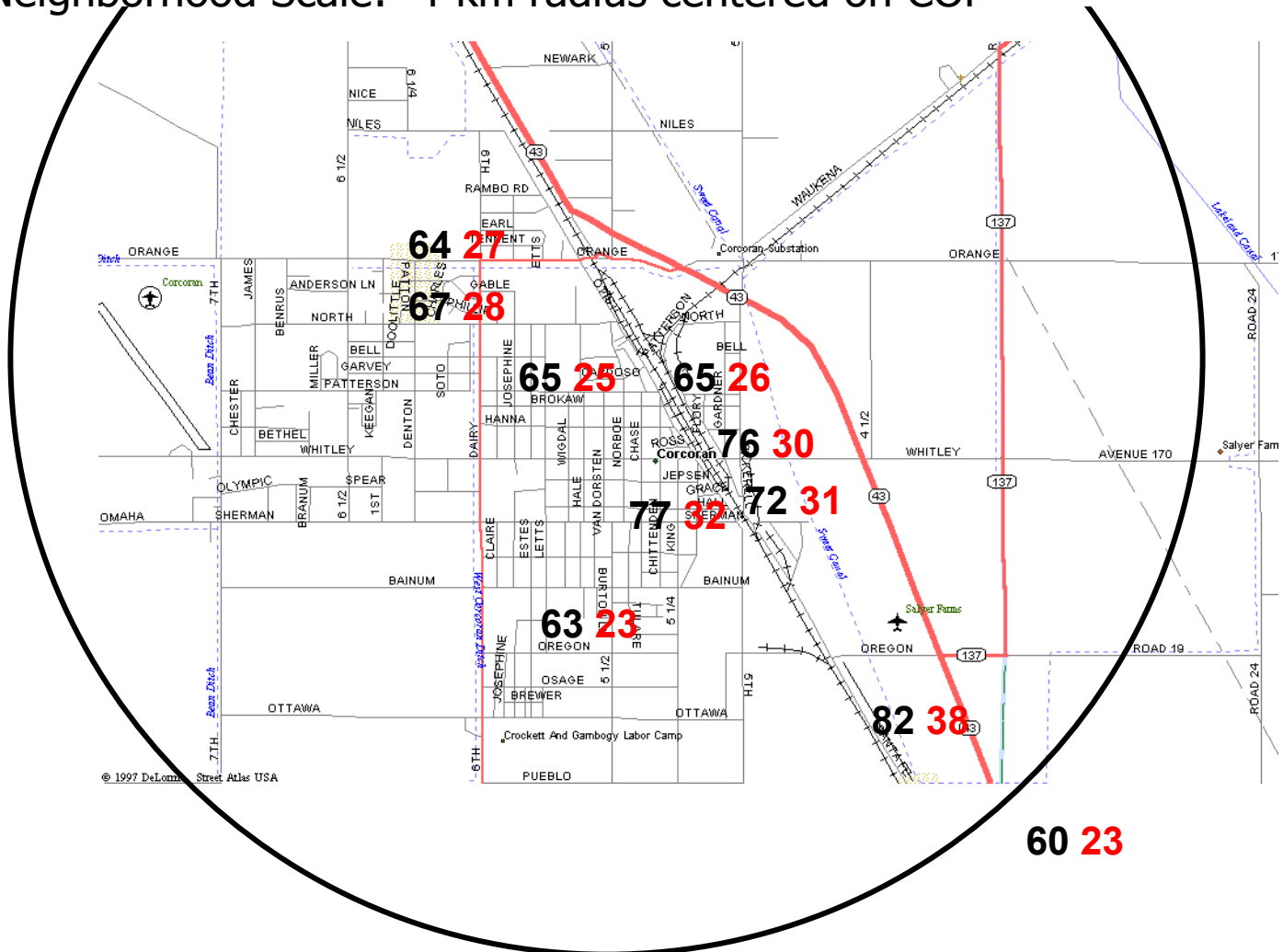


Temporal variation in PM10 geological dust shows peaks in Fall 2000 & December 1999

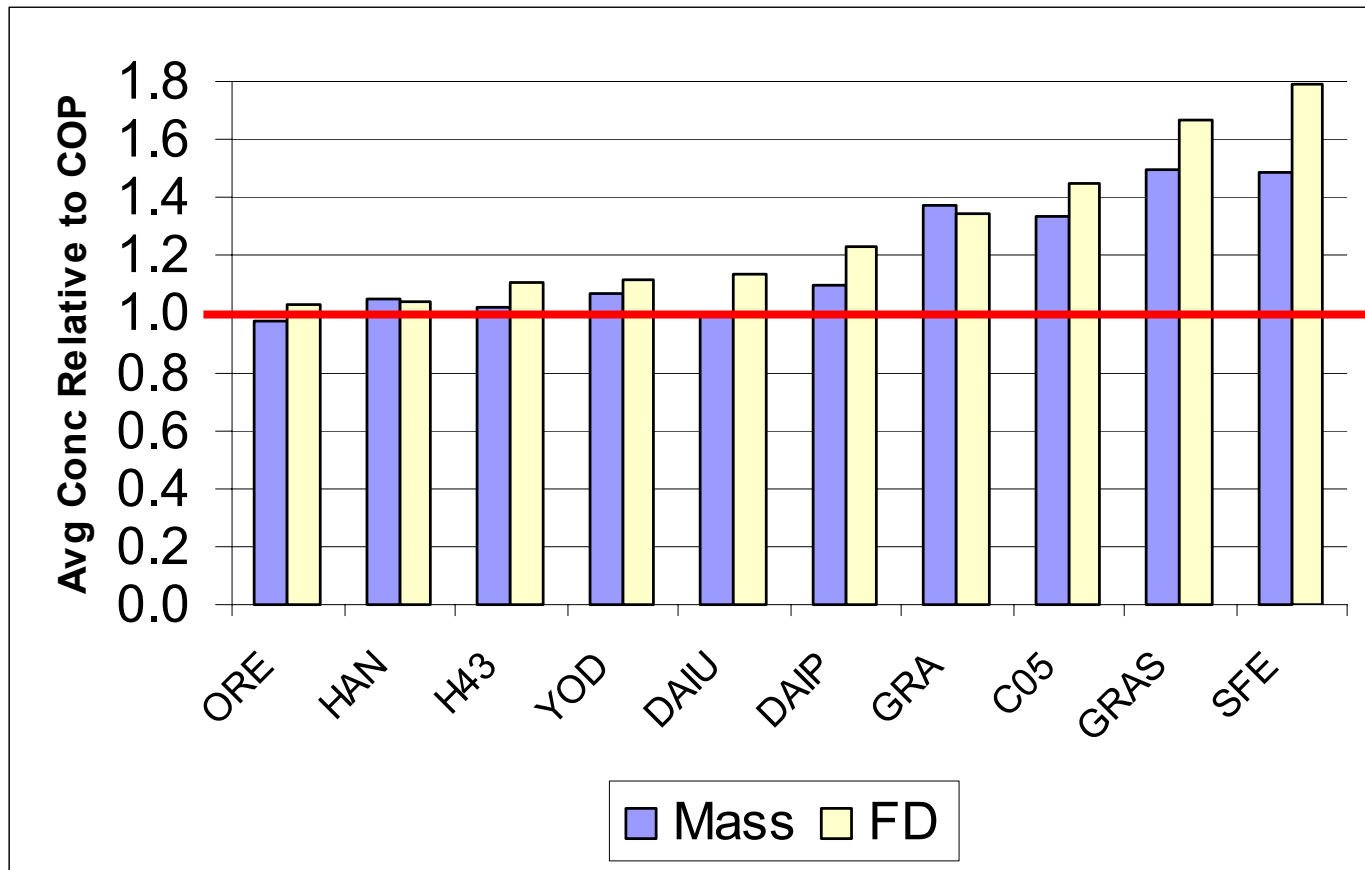


Spatial variation in PM₁₀ mass and geological dust in the Corcoran neighborhood during Fall Intensive is due to impact from local sources

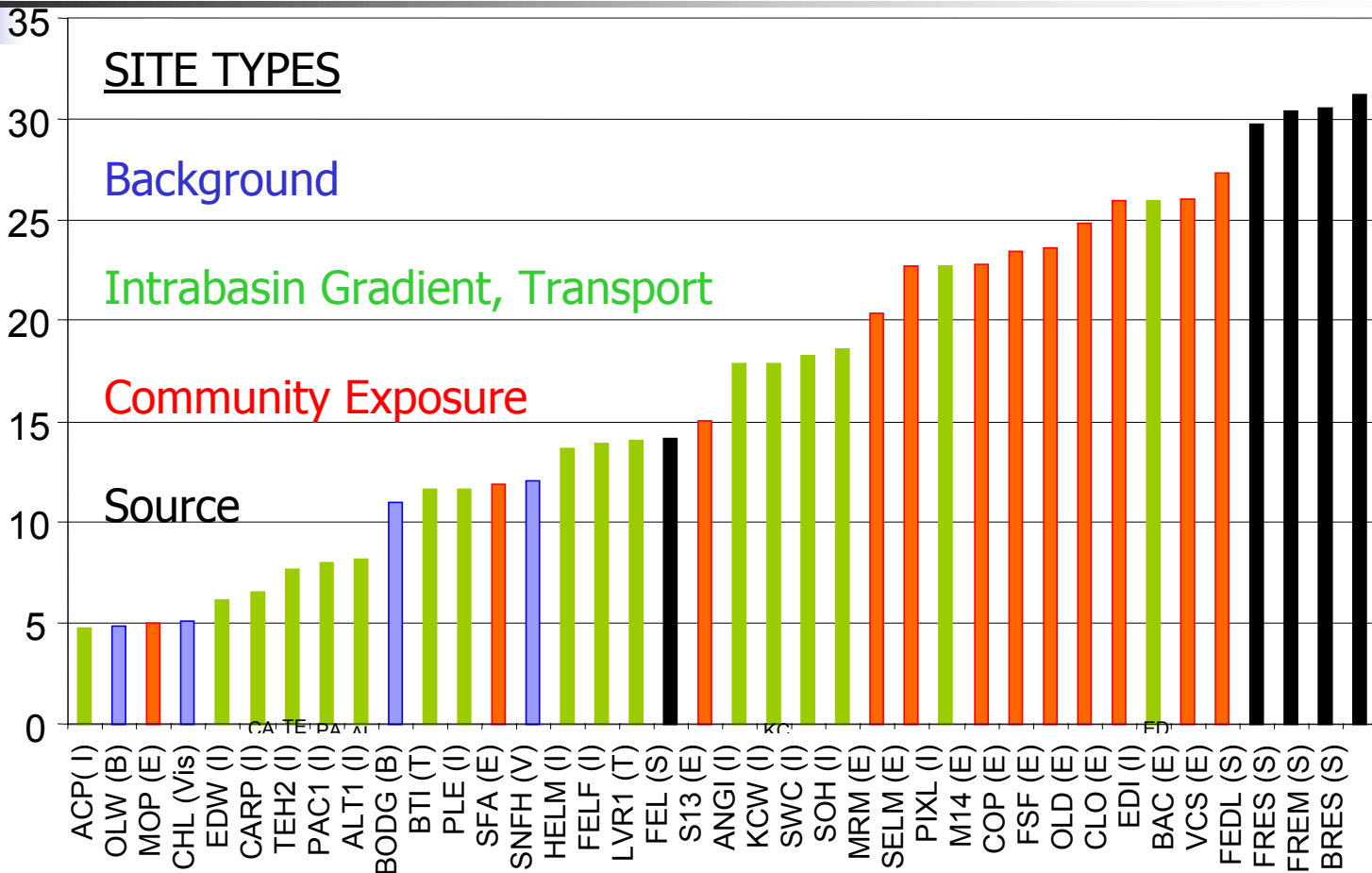
Neighborhood Scale: 4-km radius centered on COP



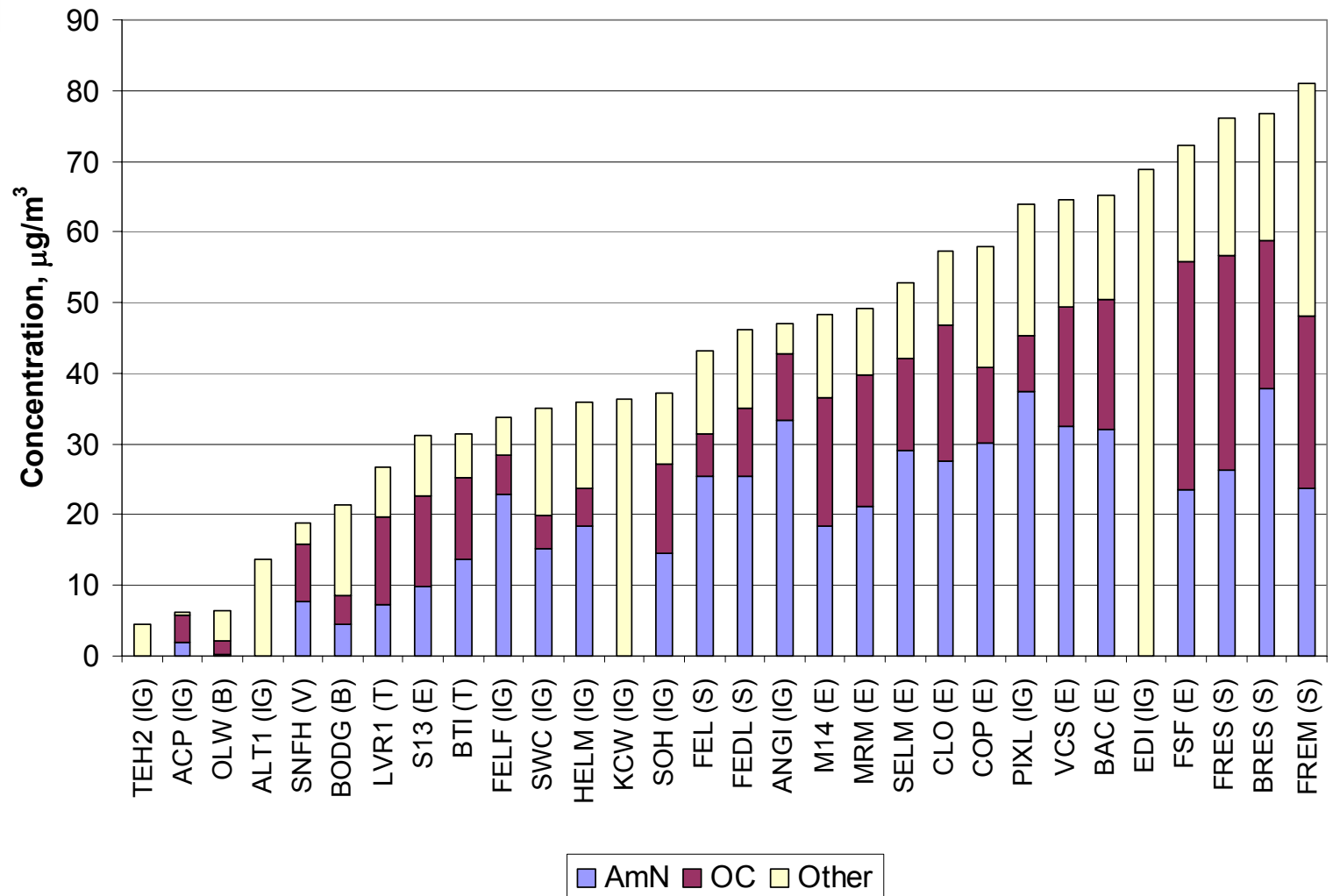
Average PM10 mass and geological dust relative to COP during Fall Intensive

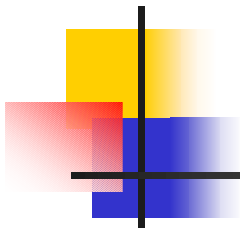


Spatial variation in PM_{2.5} mass by type of site shows a 6-fold maximum increase over background sites



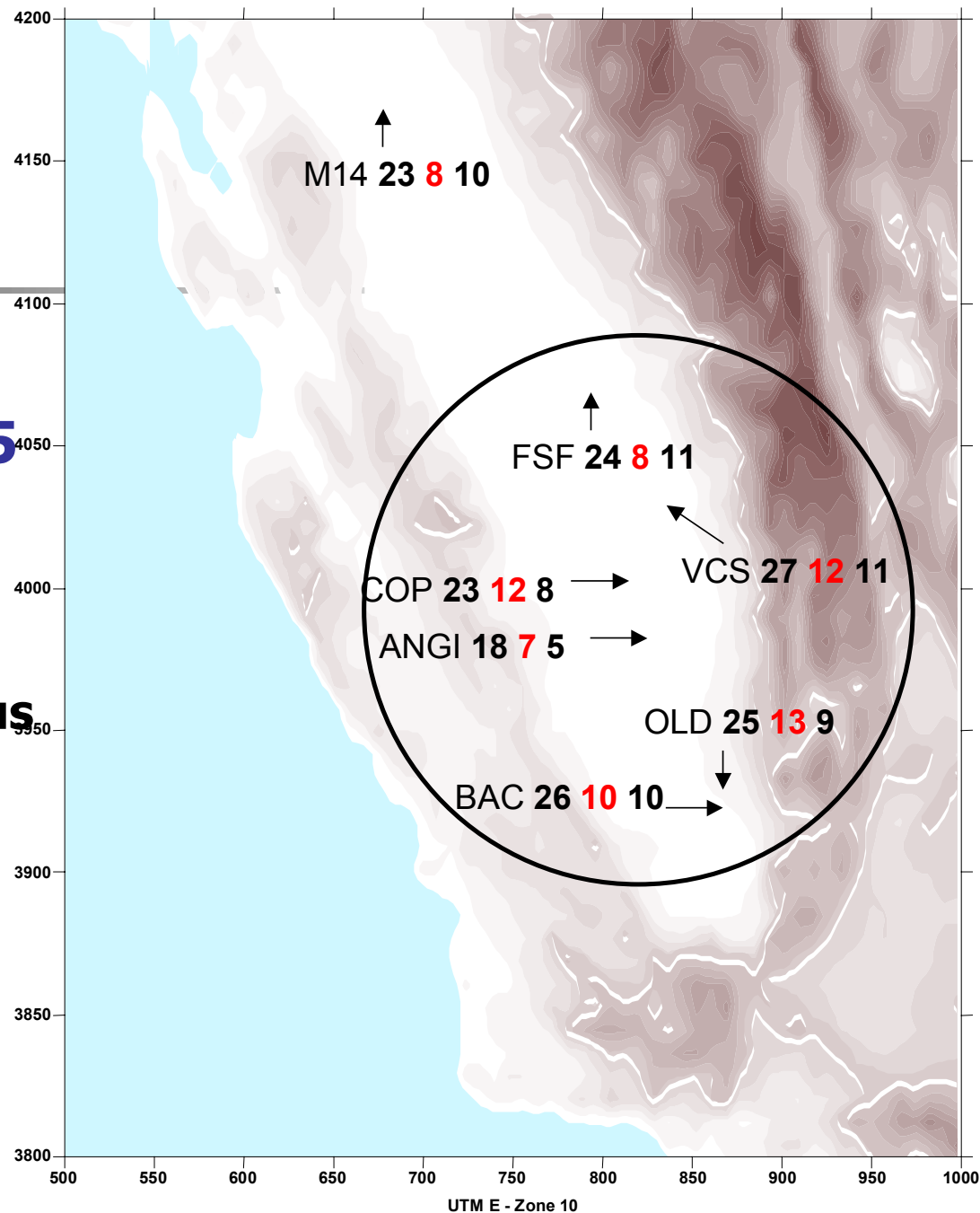
Spatial variation in PM_{2.5} composition during Winter Intensive shows up to a 16-fold increase over background sites

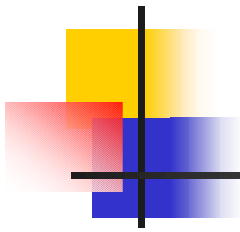




Annual average PM2.5 mass, **nitrate, and OC are relatively uniform**

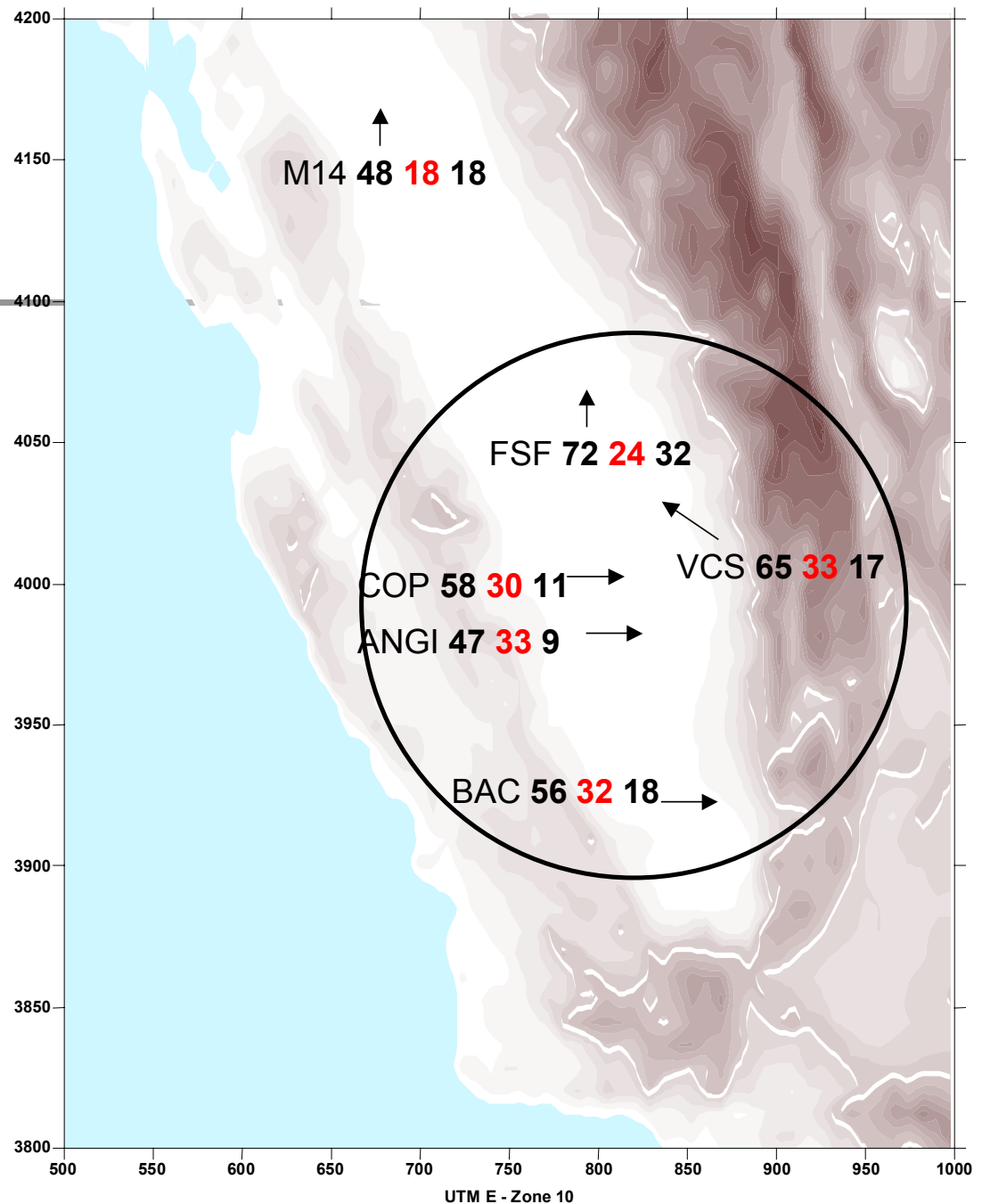
Urban scale: 100-km radius centered on COP



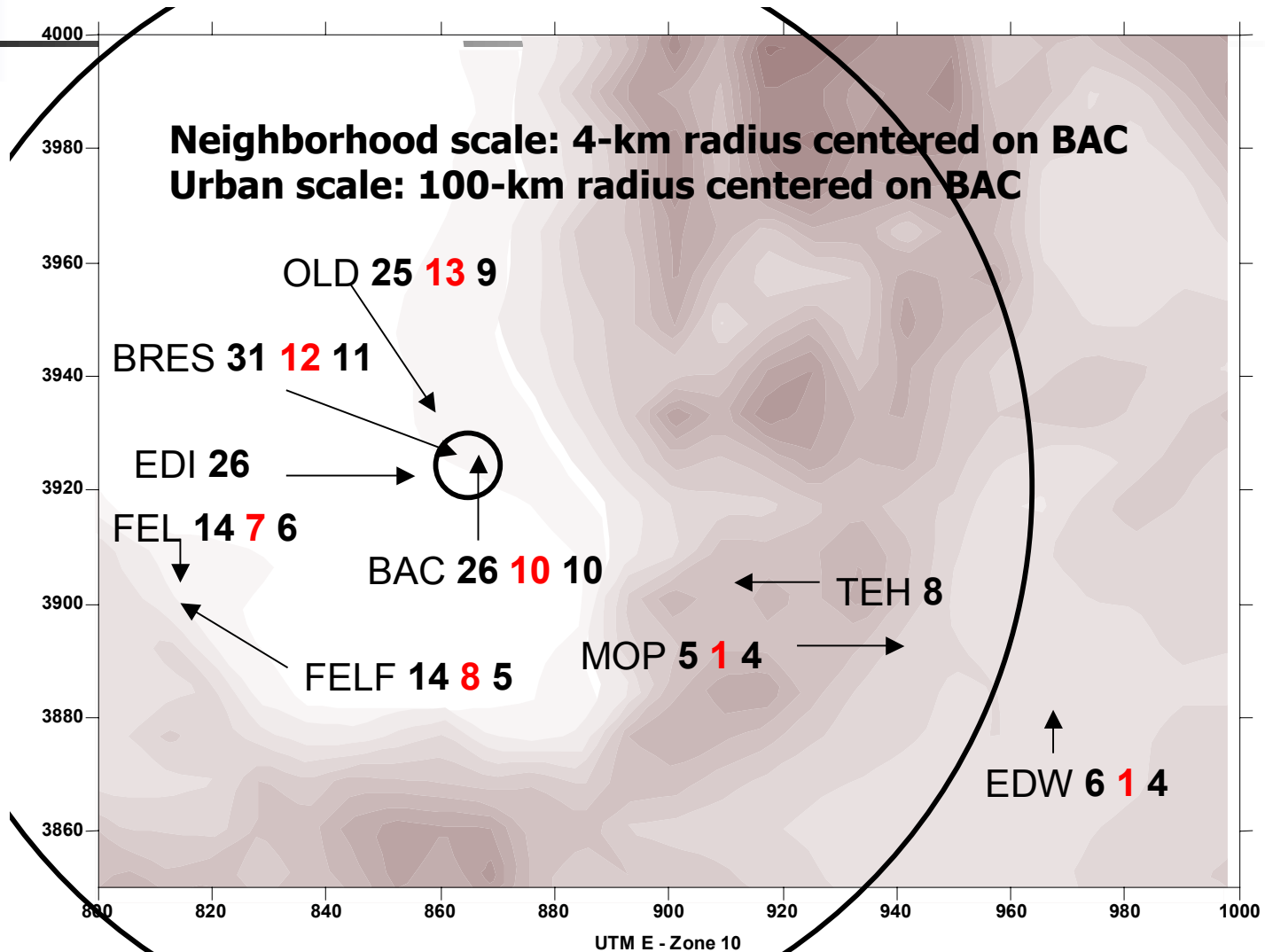


PM2.5 mass, **nitrate,
and OC during Winter
IOP days are 3 to 4
times higher than
other periods**

**Urban scale: 100-km
radius centered on COP**

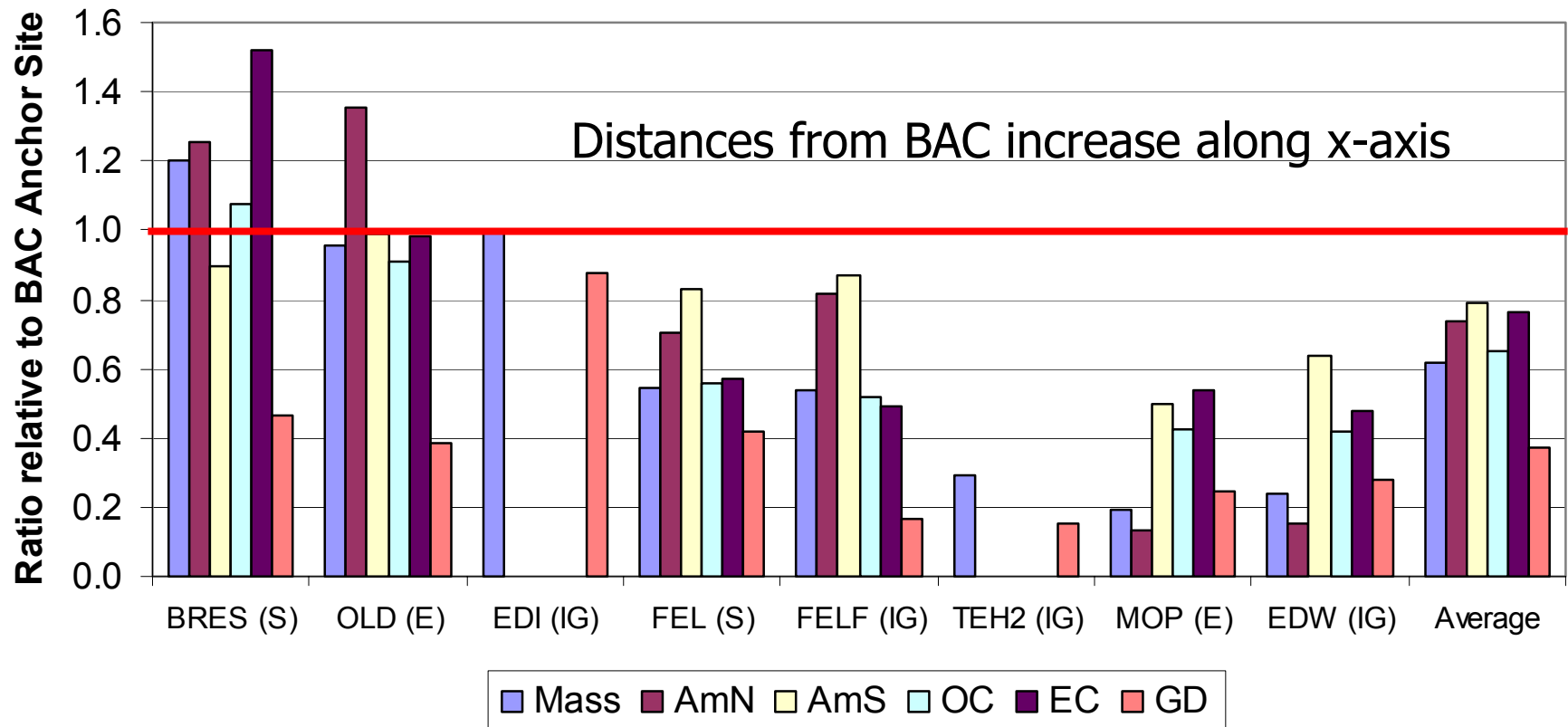


Annual average PM2.5 mass, **nitrate**, and OC in Kern County

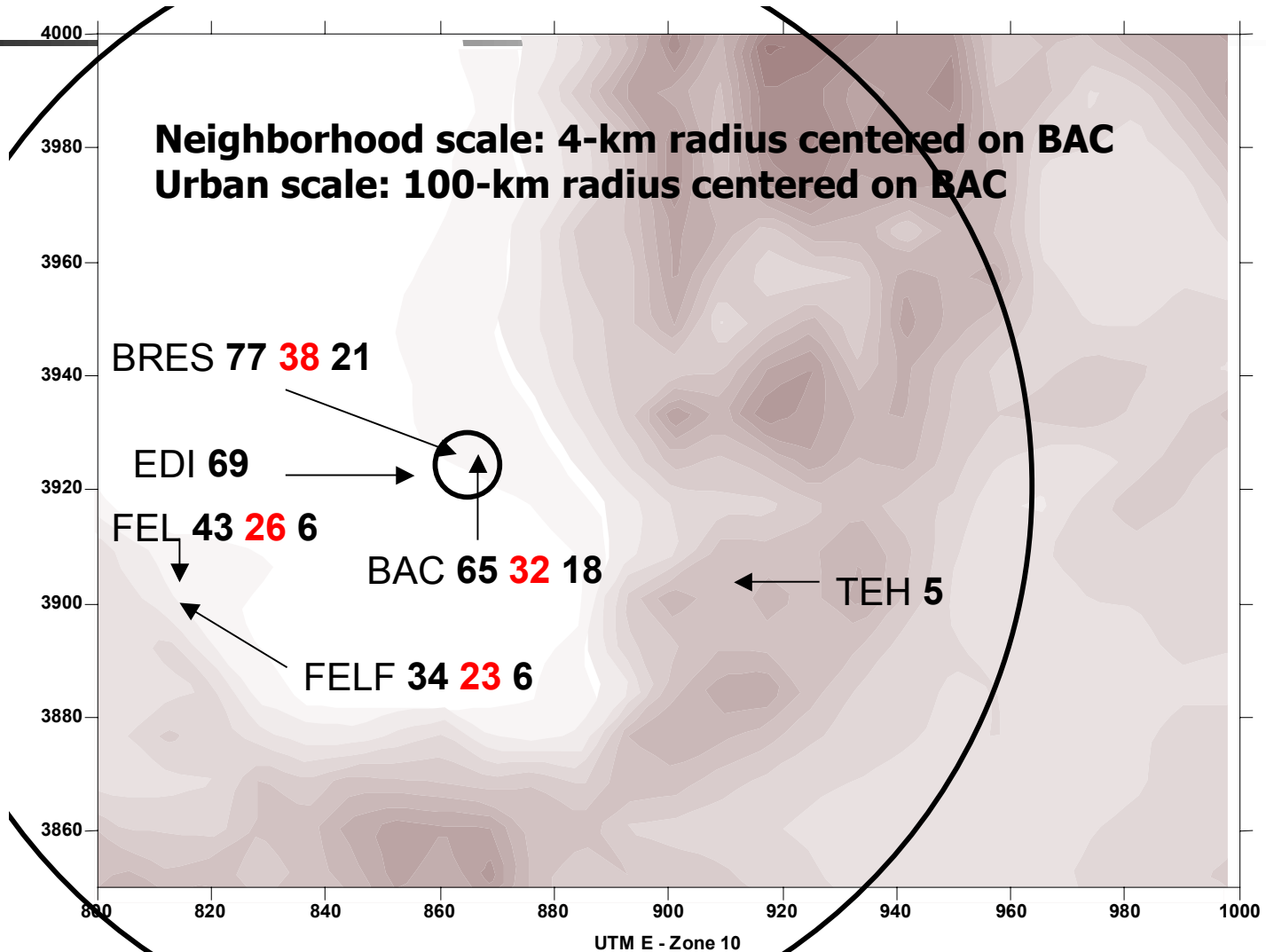


Spatial variation in PM2.5 composition at Kern County sites relative to BAC anchor site

Concentrations tend to decrease as a function of distance from BAC

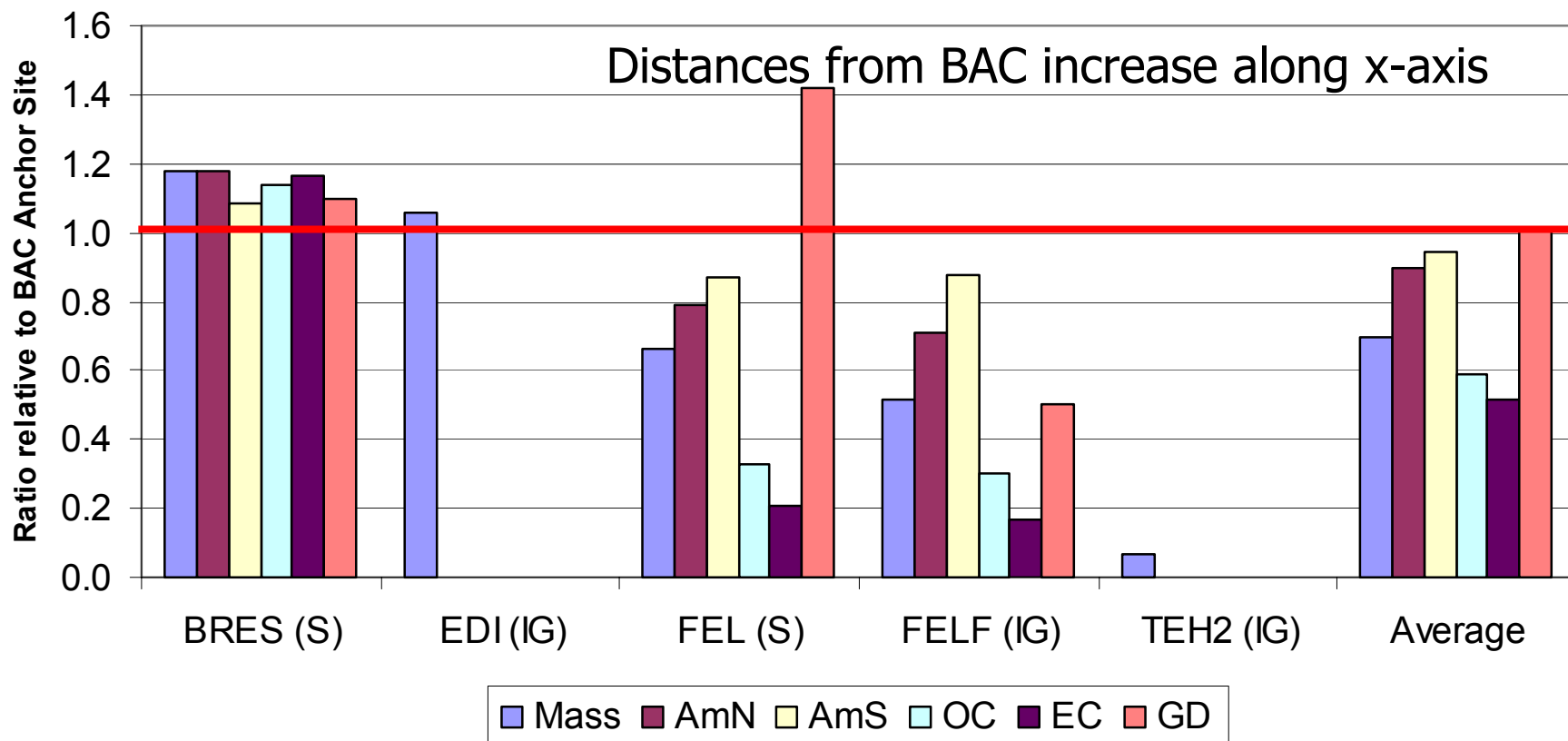


Average PM2.5 mass, **nitrate**, and OC during Winter IOP days in Kern County are 3 to 4 times higher than other periods



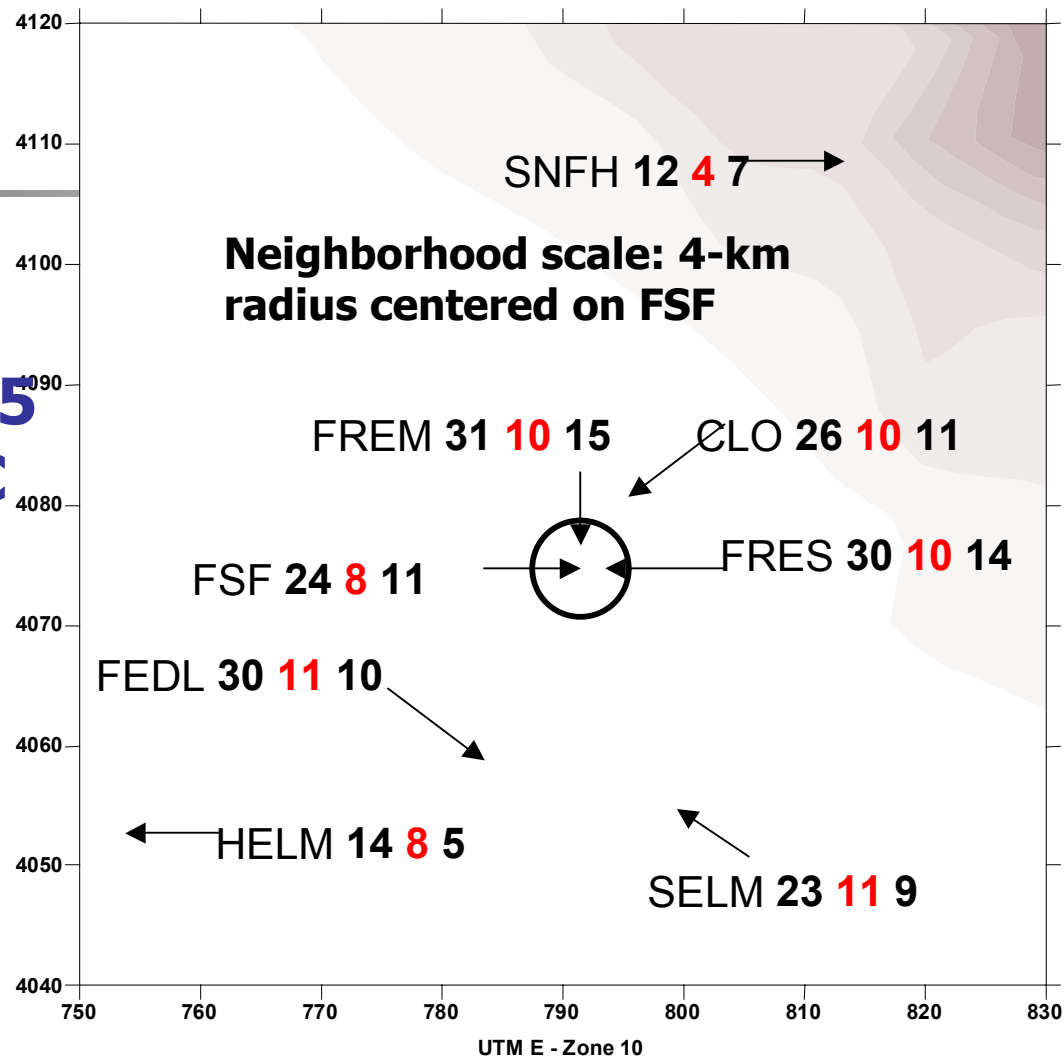
Spatial variation in PM2.5 composition at Kern County sites during Winter Intensive relative to BAC anchor site

Concentrations at two Fellows sites track each other except for GD



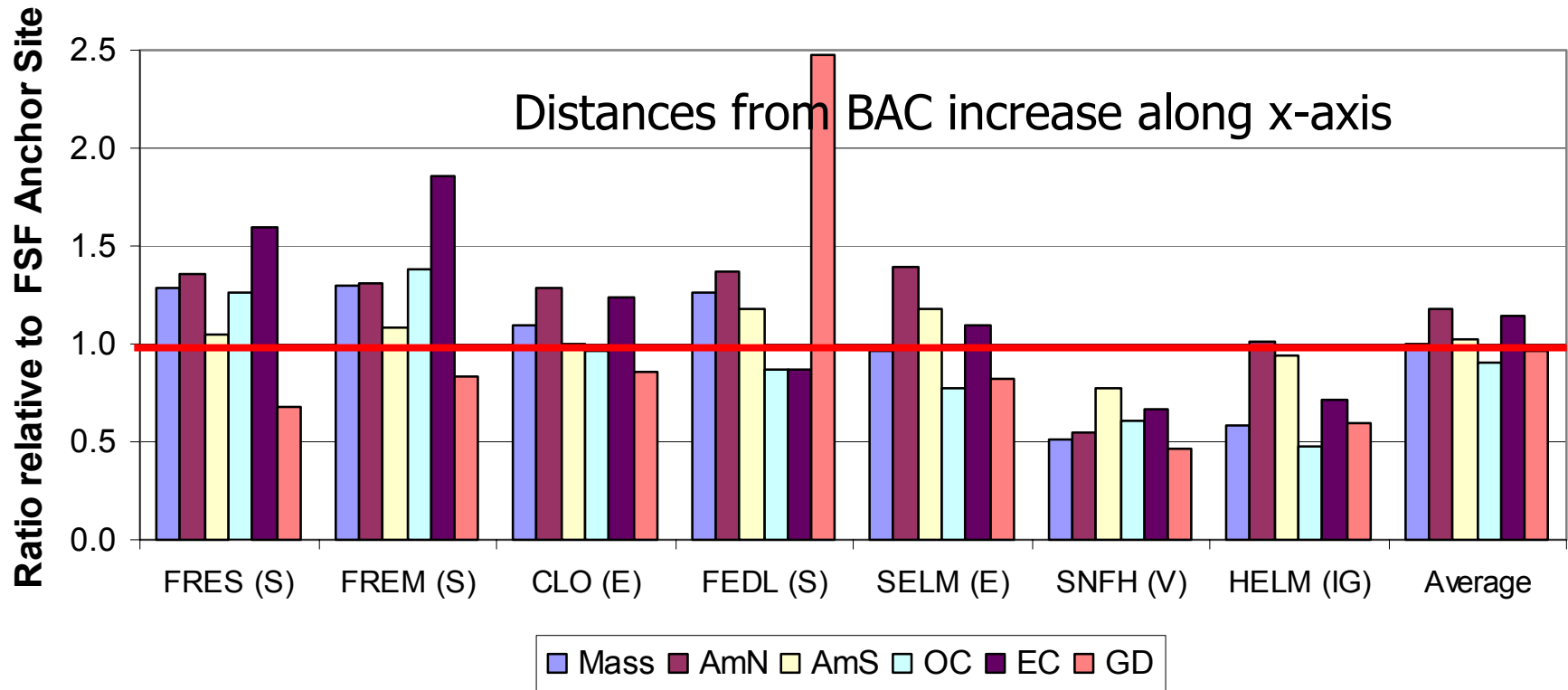


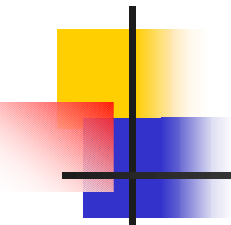
Annual Average PM2.5 Mass, **Nitrate**, and OC in Fresno County



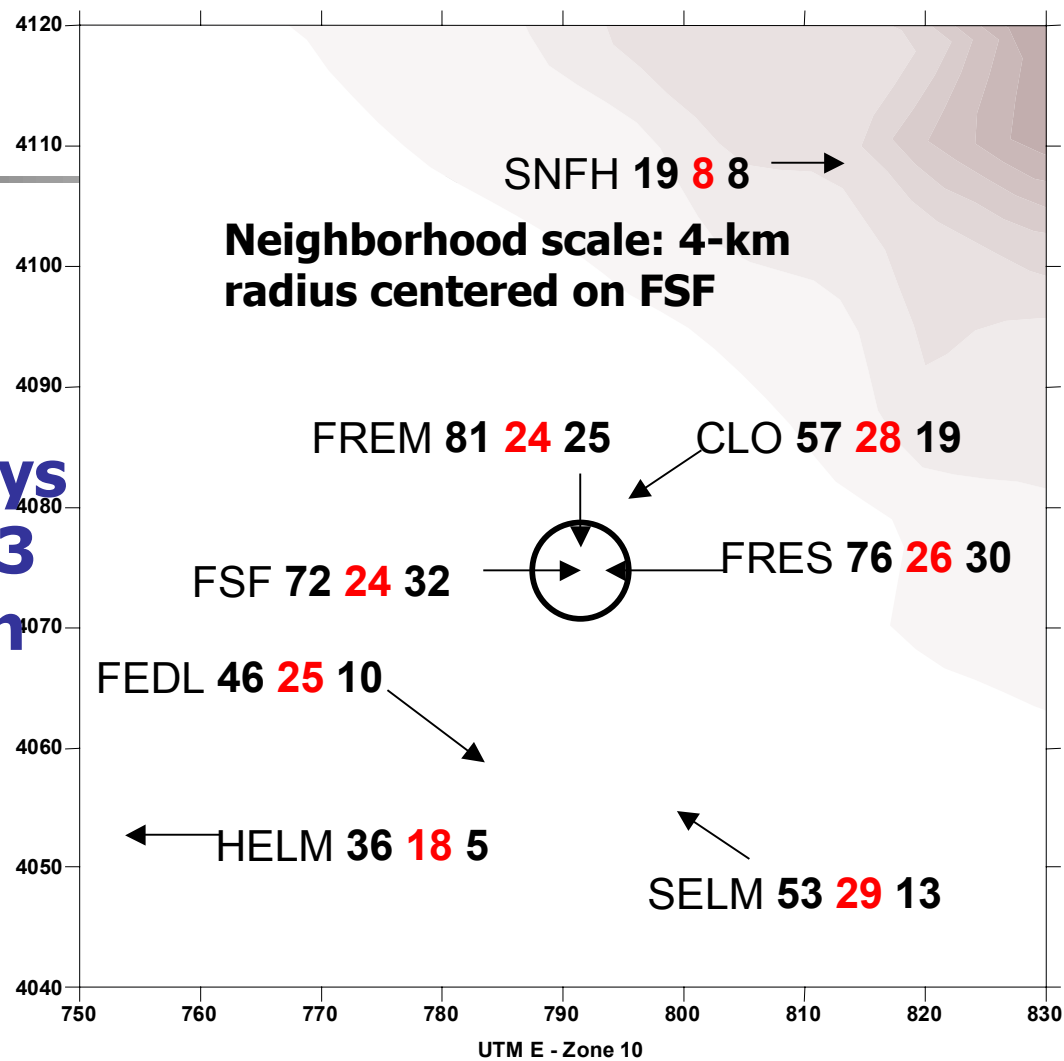
Spatial variation in PM_{2.5} composition at Fresno County sites relative to FSF anchor site

Concentrations are higher in source dominated areas

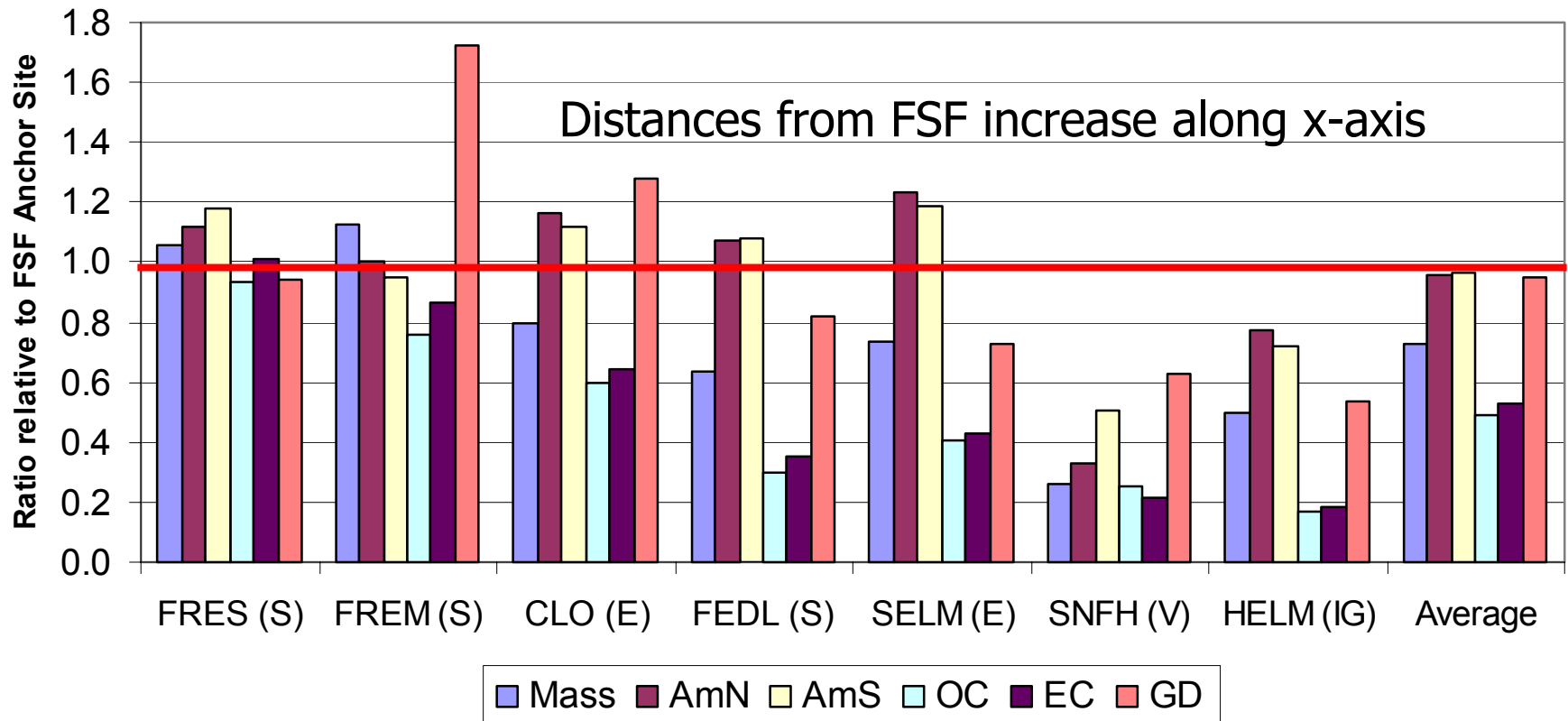




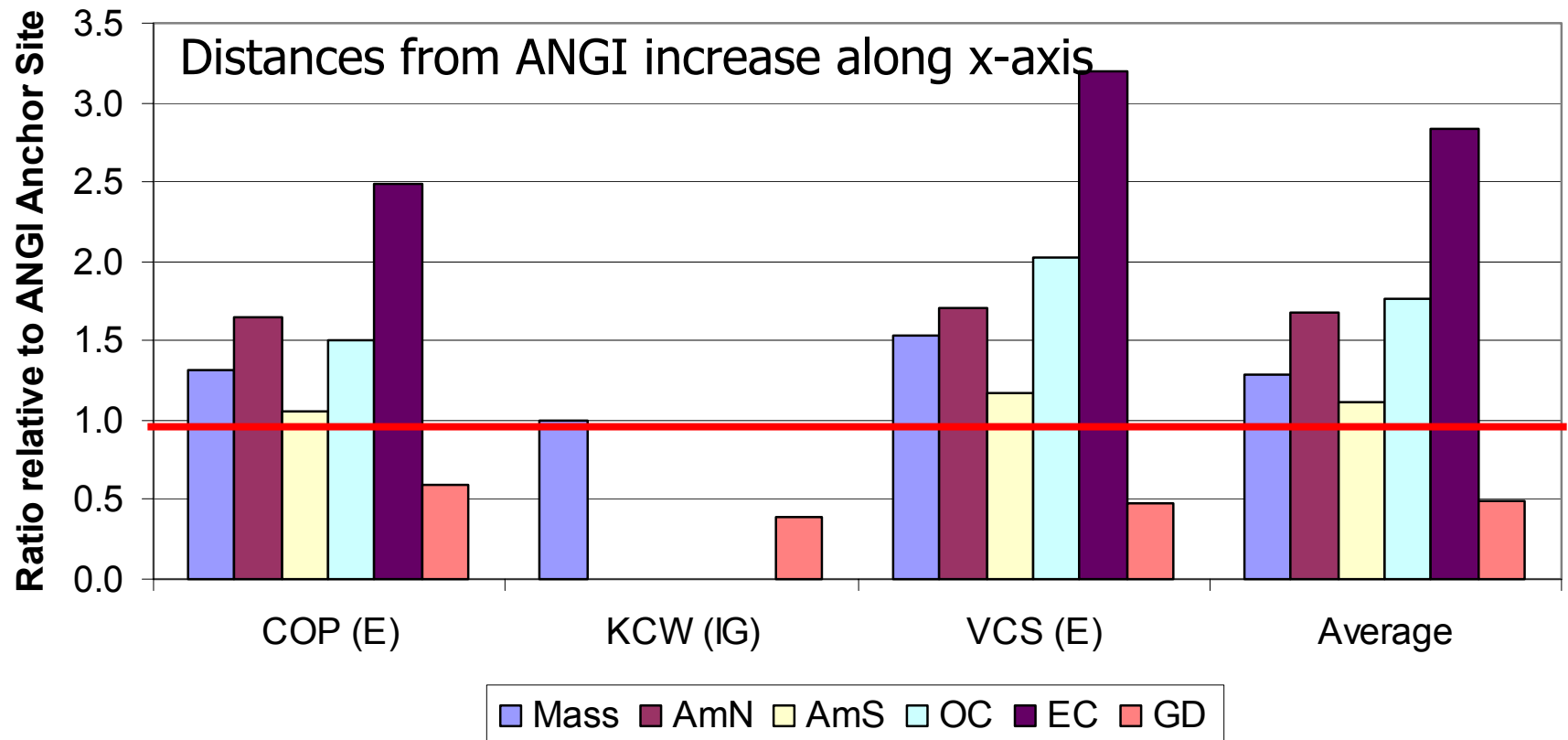
Average PM2.5 mass,
nitrate, and OC
during Winter IOP days
in Fresno County are 3
to 4 times higher than
other periods



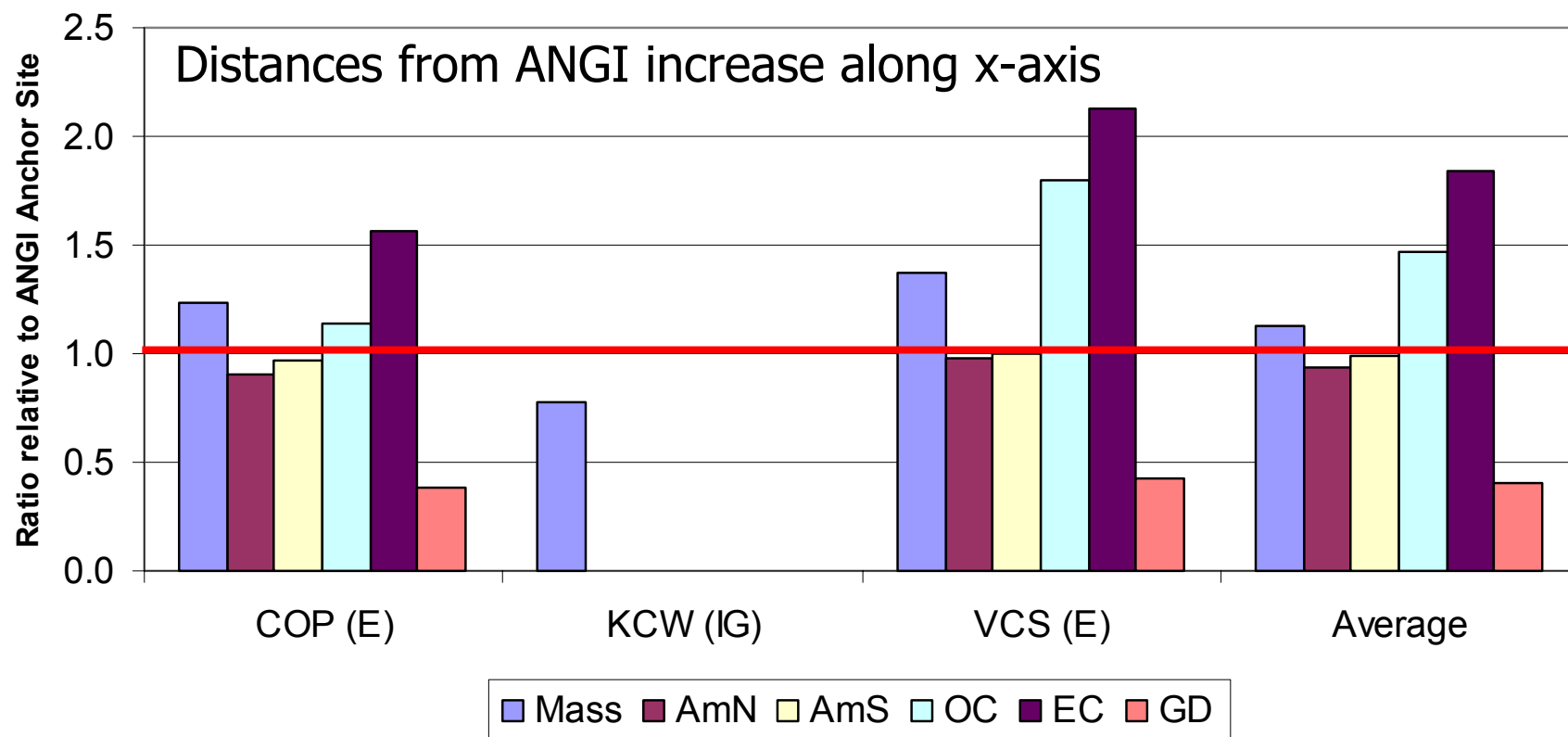
Spatial variation in PM2.5 composition at Fresno County sites during Winter Intensive relative to FSF anchor site



Spatial variation in PM2.5 composition at sites in vicinity of ANGI anchor site



Spatial variation in PM_{2.5} composition at sites in vicinity of ANGI during Winter Intensive relative to ANGI anchor site





Conclusions

Geological dust concentrations

- impacted by local sources
- decrease with distance from source (25% loss within 1 mile observed during Fall intensive)
- limited ground level transport due to low surface wind speeds
- lower at community exposure site in northern SJV compared to central and southern SJV
- highest in fall, but also very high in December 1999
- highest in vicinity of cotton handling operations; also very high near cattle feedlot
- account for ~70% of PM₁₀ mass May thru September
- minor component of PM_{2.5} mass (< 10%)



Conclusions (continued)

PM_{2.5} concentrations

- up to 6-fold increase over background sites for annual averages, and 16-fold increase during winter
- highest concentrations observed at source dominated sites, followed by community exposure sites
- relatively uniform concentrations in mass, nitrate, sulfate, OC and EC for annual averages at community exposure sites, less so during winter



Conclusions (continued)

Representativeness of Sites

- long-term network of community exposure sites generally does a good job of representing primary and secondary PM contributions; however, need collocated measurements to quantify inherent uncertainty
- maintaining operation of satellite PM monitoring sites and equipping more sites with continuous monitors for particulate species and/or particulate surrogates is needed to document effect of recently adopted control measures to attain PM NAAQS